

Description

Lifting Device And Method

Technical Field

The present invention relates to lifting devices generally and, more particularly, but not by way of limitation, to a novel lifting device and method of use thereof that are versatile and the device of the present invention can be folded for storage and transport.

Background Art

It is a principal object of the present invention to provide a lifting device that can lift and support a load.

It is a further object of the invention to provide such a device that supports a load via a fork, surface, hook, or container.

It is an additional object of the invention to provide such a device that can be used to transport a load over a wide range of obstacles.

It is another object of the invention to provide such a device that can be used as a stable variable height work surface including the means for securing a workpiece to the same.

It is yet a further object of the invention to provide such a device that can be used to replace a hand truck, a lifting table, a portable work bench, a pallet jack, a hoist, a utility cart, and a wheelbarrow.

It is yet an additional object of the invention to provide such a device that is cost effective.

It is yet another object of the invention to provide such a device that requires a minimum number of simple elements to achieve its purpose.

A further object of the invention is to provide such a device that is capable of being folded.

An additional object of the invention is to provide such a device that is

structurally efficient and lightweight.

Yet a further object of the invention is to provide such a device that is an efficient means of lifting a load.

Yet an additional object of the invention is to provide such a device that has a self-contained power source with a manual backup.

Yet another object of the invention is to provide such a device that provides a high degree of safety.

It is a further object of the invention to provide such a device that can be folded for storage and transportation.

It is an additional object of the invention to provide such a device that can be used by a consumer with minimal technical background.

Other objects of the present invention, as well as particular features, elements, and advantages thereof, will be elucidated in, or be apparent from, the following description and the accompanying drawing figures.

Disclosure of Invention

The present invention achieves the above objects, among others, by providing, in a preferred embodiment, an apparatus, comprising: a column normally generally vertical when a device of which said column is a part is in an operating position; and a platform operatively connected at one end to said column and normally generally horizontal when said device is in an operating position, said platform being selectively raised or lowered to raise or lower a load placed on said platform.

Brief Description of Drawings

Understanding of the present invention and the various aspects thereof will be facilitated by reference to the accompanying drawing figures, provided for purposes of illustration only and not intended to define the scope of the invention, on which:

Figure 1 is a side elevational view of the device of the present invention

with the lifting platform thereof in lowered position.

Figure 2 is a rear elevational view of the device with the lifting platform thereof in lowered position and with an intermediate position of the lifting platform shown in broken lines.

Figure 3 is a front elevational view of the device with the lifting platform thereof in lowered position.

Figure 4 is a side elevational view of the device folded for storage or transport.

Figure 5 is a top plan view of the top of the column of the device.

Figure 6 is a fragmentary, isometric view of the top of the column and slide of the device.

Figure 7(A) is an isometric view of one embodiment of the forks of the device.

Figure 7(B) is a fragmentary, isometric view of a further embodiment of the forks of the device.

Figure 8 is an isometric view of one embodiment of the chassis of the device, without lock 80.

Figure 9 is a fragmentary, isometric view of the top of the column of the device, showing the lead screw and the drive motor, with the housing removed.

Figure 10 is an isometric view showing one method of restraining or securing a load.

Figure 11 is a fragmentary, side elevational view showing the device used as a crane.

Figure 12 is a fragmentary, isometric view of a main wheel of the device with a motor drive.

Figure 13 is a side elevational view of one embodiment of a front wheel of the device.

Figures 14(A) – 14(F) show various embodiments of front wheels.

Figures 15(A) – 15(C) show a wheel collar.

Figures 16(A) – 16(E) show various uses to which the platform may be

put.

Figures 17 and 18 are isometric views showing the operation of lock 80.

Best Mode for Carrying Out The Invention

Reference should now be made to the drawing figures on which similar or identical elements are given consistent identifying numerals throughout the various figures thereof, and on which parenthetical references to figure numbers, when used, direct the reader to the view(s) on which the element(s) being described is (are) best seen, although the element(s) may be seen on other figures also.

Figure 1 illustrates a lifting device, constructed according to the present invention, and generally indicated by the reference numeral 30. Major elements of device 30 shown on Figure 1 are a chassis 40 rotatably attached at the base of a column 42, a right wheel 44 rotatably attached to the chassis, a handlebar 46 and a drive motor 48 fixedly disposed at the top of the column, a brake handle 50 rotatably disposed at the top of the column, a brake rod 52 extending from the brake handle to a brake mechanism 54 bearing a right brake 56, a right front fork bearing 58, rotatably attached to a right fork 60 (the fork bearing and the fork being described in more detail with respect to Figure 7(A)), a removable platform 62, and a right pad 64 fixedly disposed at the front end of the chassis. A housing 68 is disposed above drive motor 48 contains a motor current overload circuit which sounds an alarm and/or flashes a light when the motor current reaches a predetermined level and an electronic tilt mechanism which also sounds an alarm and/or flashes a light when device 30 is tilted a predetermined degree.

Figure 2 illustrates lifting device 30 and in addition to the elements described with reference to Figure 1, shows a left wheel 70, a left brake 72, and a battery 74 for powering drive motor 48. Wiring connecting battery 74 and drive motor 48 is not shown. Also shown on Figure 2 are a lock 80 that locks column 42 to chassis 40, with the column in near vertical position, and a control

84. The latter element is rotatable about handlebar 46 with rotation in one direction causing platform 62 to rise and rotation in the other direction causing the platform to be lowered. Platform 62 is shown in broken lines in an intermediate position. Lock 80 is described more fully with reference to Figures 17 and 18.

Continuing to refer to Figure 2, the operation of brake mechanism 54 will be evident. Squeezing brake handle 50 toward handle bar 46 causes brake mechanism 54 to rotate and press right and left brakes 56 and 72 against right and left wheels 44 and 70, respectively. A locking tab 90 rotatably attached to brake handle 50 can be rotated against column 42 to hold brakes 56 and 72 against wheels 44 and 70. This is useful when it is desired to hold device 30 in place.

Figure 3 illustrates device 30 and in addition to the elements described with reference to Figures 1 and 2 there is shown a left fork 100, a handle 102 fixedly attached to column 42, a light 104, and a lead screw 106. (Handle 102 and light 104 not shown on Figures 1 and 2). Handle 102 is useful in storing or transporting device 30.

Figure 4 illustrates device 30 in folded position for storage or transport. It will be understood that lock release handle 82 (Figure 2) has been pulled upwardly releasing lock 80 so that chassis 40 can be folded against column 42 and the lock engaged. Device 30 can now be stored or transported in the position shown or the device can be stored or transported horizontally. Also shown on Figure 4 is left front fork bearing 110. Brake locking tab 90 can be activated when device 30 is in its folded position (Figure 4).

Figure 5 illustrates column 42. Two rear channels 120 and 122 extending the length of column 42 are defined in the rear of the column and are open to the front of the column by passageways 124 and 126, respectively. Two forwardly open channels 130 and 132 extending the length of column 42 are defined in the front of the column. Lead screw 106 is disposed in a forwardly open channel 140 extending the length of the column is defined halfway between forwardly

open channels 130 and 132. Two flanges 150 and 152 extending the length of column 42 extend sideways from forwardly open channel 140. Two sidewardly open channels 160 and 162 extend the length of column 42.

Figure 6 illustrates a slide 170 which has two ears 172 and 174 that slidably engage flanges 150 and 152, a rearwardly facing vertical gear 176 extends into forwardly open channel 140 and engages leadscrew 106 (not shown on Figure 6), and a forwardly open horizontal channel 178.

Figure 7(A) illustrates a carriage generally indicated by the reference numeral 180. Carriage 180 includes right and left forks 60 and 100 fixedly attached to horizontal fork extensions 190 and 192, respectively. Two rear fork bearings 200 and 202 are horizontally rotatably disposed at the upper end of right fork 60 and two rear fork bearings 204 and 206 are horizontally rotatably disposed at the upper end of left fork 100.

Referring back to Figure 6, it will be understood that rear fork bearings 200 and 202 ride up and down in channel 120, while rear fork bearings 204 and 206 ride up and down in channel 122. At the same time, front left fork bearing 110 rides up and down in channel 132, while front right fork bearing 58 (Figure 1) rides up and down in channel 130. The force raising and lowering forks 60 and 100 is provided by the engagement of a horizontal rod 210 with channel 178. Thus, as leadscrew 106 turns, slide 170 will ride up and/or down, causing forks 60 and 100 to ride up and/or down. Passageways 220 and 222 may be defined in column 42, respectively, for wiring for drive motor 48 (Figure 2) and brake rod 52.

Referring again to Figure 7(A), one or more tie downs 230 may be provided along the length of fork extensions 190 and 192. An adjustable horizontal nosepiece 240 extends from the ends of forks extensions 190 and 192 and is adjustable by means of a hand crank 250 and screw 252.

Figure 7(B) illustrates that a fork attachment 260 can be adjustable by virtue of interfitting stationary fork embodiment extension 262.

Figure 8 illustrates one embodiment of chassis 40. Here, battery

compartment 270 is more clearly shown. Front wheels 280 and 282 are rotatably mounted, respectively, at the distal ends of leg extensions 284 and 286 and a foot pad 288 is provided at the proximal end of chassis that is useful when the operator requires assistance in tilting device 30 back or adding his or her weight to the rear of the chassis to prevent the device from falling forward, as might occur in the case of lifting an overhanging load. Also indicated on Figure 8 is a line 289 about which column 42 rotates from an operating position (Figure 1) to a folded position (Figure 4).

Figure 9 illustrates a top plate 290 (shown, for convenience as spaced apart from the top of column 42, but fixedly attached to the top of the column) on which is mounted drive motor 48 and reduction gearing 292. A leadscrew bearing 300 axially and radially supports the upper end of leadscrew 106. A leadscrew sleeve 310 extends the length of column 42. Also shown on Figure 9 is an upper ball foot 320 which engages a surface on which device 30 rests when column 42 is in a horizontal position.

Figure 10 illustrates adjustable horizontal arms 330 and 332 disposed, respectively, in channels 160 and 162. One or more tie down straps 340 may be hooked to one or both of the arms (only one end of a strap shown).

Figure 11 illustrates device 30 optionally used as a crane.

Figure 12 illustrates a rear wheel 350 driven by an electric motor 352.

Figure 13 illustrates one embodiment of a front wheel generally indicated by the reference numeral 360. Wheel 360 is fixedly disposed at the distal end of a leg extension 370. Wheel 360 includes a plurality of balls, as at 380, disposed between an upper raceway 382 and a lower raceway 384. Wheel 360 is supported by lower raceway 384 and is horizontally offset from the midpoint of the lower raceway. Keepers 390 keep the upper raceway 382 and the lower raceway 384 together.

Figures 14(A) – 14(F) show various embodiments of front wheels attached to a leg 400. Figure 14(F) combines the embodiments shown on Figures 14(B), 14(D), and 14(E). The embodiments are mounted on an extension 410 and the

embodiment is selected by pulling, rotating, and releasing the extension. The figures at the left side of Figure 14(F) show the various embodiments.

Figure 15(A) illustrates a wheel collar 420 that can be placed around a wheel to dramatically increase the footprint of the wheel as may be required when traversing soft surfaces such as grass, sand or loose soil with device 30 heavily loaded. Wheel collar 420 includes two locating pins 430 and 432, a cam lock 434, and a tire pocket 436. Wheel collar 420 may be filled with foam 440.

Figure 15(B) illustrates wheel collar 420 being placed around a wheel 450, while Figure 15(C) illustrates the wheel collar in place on the wheel.

Figure 16(A) illustrates that platform 62 may be outfitted with a plurality of holes, as at 450. Thus outfitted, a toolbox 460 may be placed on platform 62 or a compartment box 462 may be placed on the platform as shown on Figure 16(B). Platform 62 is of sufficient rigidity that one or more tie down straps 470 may be sufficiently anchored and tensioned in a variety of locations, preferably anywhere around the entire perimeter of the platform. For more severe requirements, one or more flush mounted ratcheting tie down stations with additional reinforcement may be provided.

Figure 16(C) illustrates platform 62 outfitted with two riser frames 480 and 482 which engage a seat 484. Riser frames may be particularly helpful in extracting and replacing rear seats of SUV's where the space between the vehicle's seat belt attachments and adjusters coupled with the depth (to clear the rear bumper) required to pick up the seat makes this a challenge.

Figure 16(D) illustrates platform 62 outfitted with a ring 490 for lifting circular items such as trash cans.

Figure 16(E) illustrates platform 62 outfitted with two clamps 500 and 502 to effect a vise, with clamp 500 being disposed in a nosepiece 504. Nosepiece 504 preferably has a beveled leading edge to aid in slipping platform 62 under a load such as a cardboard box. A V-groove 510 disposed on an edge of platform 62 acts as a jaw and aid in locating and capturing round stock.

Figures 17 and 18 illustrate the operation of lock 80.

Referring first to Figure 17, column 42 is shown in folded position having been rotated about pivot 289 (Figure 8). A link 600 rotatably attached to pivot 590 extends from the pivot and is rotatably attached at a second pivot 602 to a handle 604. Handle 604 is fixedly attached to a sleeve 610 which is rotatable about chassis 40. A spring-loaded catch mechanism 620 is rotatably attached to handle 604 and includes catches 622 that engage a horizontal bar 624 extending between the sides of link 600 when column 42 is in an unfolded position.

While the dimensions and weight of device 30 can be varied depending on the use thereof, the device shown is about fifty-four inches high and weighs about forty pounds (Figure 1-3).

In the embodiments of the present invention described above, it will be recognized that individual elements and/or features thereof are not necessarily limited to a particular embodiment but, where applicable, are interchangeable and can be used in any selected embodiment even though such may not be specifically shown.

Spatially orienting terms such as "above", "below", "upper", "lower", "inner", "outer", "inwardly", "outwardly", "vertical", "horizontal", and the like, when used herein, refer to the positions of the respective elements shown on the accompanying drawing figures and the present invention is not necessarily limited to such positions.

It will thus be seen that the objects set forth above, among those elucidated in, or made apparent from, the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown on the accompanying drawing figures shall be interpreted as illustrative only and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.